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ABSTRACT

Research is being conducted to determine the factors behind linguistic retardation in children. A first question raised was whether the linguistic system of the deviant child is qualitatively different from that of a normal child. A matching-up of deviant and normal children according to linguistic level suggests that the onset of base syntax may be delayed in the deviant child by three and a half years, and that the time needed to pass from one level to another may be two and a half years longer in the deviant child. A further study showed that the deviant and the normal group had similar organization of phrase structure grammars, but that the deviant group did not use major linguistic categories in as many different contexts as the normal group. To determine what this information could relate about the nature of the deviant child's deficit, utterances are being collected and analyzed on the basis of semantic categories. Preliminary analysis suggests the deficit lies in the ability to develop additional terms and relationships in which to use them. This information leads to the question of a cognitive deficit. Experimentation tends to support the idea that linguistic level and symbolization correspond more closely in deviant children than linguistic level and general nonverbal development. A final hypothesis is that children with linguistic deficits reflect a base representational rather than a base intellectual deficiency, and that diagnostic tests should reflect this pattern. (AM)

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EARLY GRAMMATICAL AND SEMANTIC RELATIONS: SOME IMPLICATIONS FOR A GENERAL REPRESENTATIONAL DEFICIT IN LINGUISTICALLY DEVIANT CHILDREN

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Despite an apparently strong biological component for language development, some children--including those without any detectable brain dysfunction--experience extreme difficulty in acquiring language at a normal rate. We began our research by asking some rather simple questions regarding the linguistic systems of such children. The first question was determined for us. On the basis of the early work of Menyuk (1964) we asked whether or not the linguistic system of the deviant child was indeed qualitatively different from the system of the normal child. An important methodological consideration in determining whether or not a qualitative difference exists depends, in part, on the criteria by which deviant and normal groups are matched.

Developmental research, primarily the research generated by the theories of Chomsky and Piaget, strongly suggests that rule-based behavior develops in definable levels (stages) and that each level is qualitatively different from the preceding or following level. This research suggests that the matching of normal and deviant groups on general developmental criteria such as age, socio-economic level and IQ might be biased against the deviant child since the deviant child is most probably functioning at a lower level of linguistic development. If so, then linguistic level differences could account for the findings of a qualitative difference between normal and linguistically deviant children.

To avoid this methodological problem, we followed the work of Roger Brown (1970) and used linguistic level rather than general developmental criteria (age, socio-economic level, IQ) as the criteria for matching normal and deviant groups. Linguistic level was determined by the mean number of morphemes per utterance (MM/U). In addition, our normal group was selected to represent the most active period of learning <u>base</u> syntax; i.e., between 18 and 36 months.

Language samples (low level children--100 utterances; high level children--200-250 utterances) were collected from a population of normal and deviant children. Fifteen normal and fifteen deviant children were selected from a larger population and matched according to MM/U length. The mean age for the normal group was 28 months (range 19-37), while the mean age for the deviant group was 79 months (range 42-114). Five levels of linguistic development were determined by natural grouping of children at a particular MM/U length which reasonably corresponded to the levels determined by Brown, Cazden and Bellugi (1969). Lower level (Level I) utterances were slightly over two morphemes in length while upper level utterances (Level V) had slightly under six morphemes per utterance. (Table 1). Despite the cross-sectional nature of the data, the age disparities of the two groups suggest that the <u>onset</u> of base syntax or two word utterances may be delayed as much as three and one-half years. Moreover, <u>acquisition time</u>, or the time required to go from Level I to Level V, is nearly two and one-half years longer for the deviant child. (See Table 1).

TABLE I. Mean age, sample size, and morpheme per utterance length for the normal and deviant groups at each of the five linguistic levels.

Linguistic Level	Normal Age	Normal Sample Size	Normal MM/U	Deviant Age	Deviant Sample Size	Deviant MM/U
I	20.0	76.7	2.23	62.3	79.7	2.33
II	21.0	100.7	2.72	71.3	155.3	2.83
III	33.0	223.3	3.70	70.0	161.0	3.80
IV	34.3	242.7	4.67	88.0	200.0	4.53
V	33.7	234.0	5.61	104.6	147.7	5.83

Phrase structure grammars were written and compared for each of the children at each linguistic level. Few differences were found in grammars of the two groups, suggesting similar organization of base linguistic data. Forty transformations were also identified in the language samples of each group. The transformations were assigned absolute ranks based on their frequency of occurrence. An $r = .96$ was determined by rank order correlation indicating a high degree of similarity between the two groups in the occurrence of the forty transformations. (Figure 1). However, we noticed that for the infrequently occurring transformations (20-40), the normal group used these transformations consistently more often than did the deviant group. A sign test showed a significant difference between the two groups on infrequently occurring transformations. It should be noted that these transformations occurred five percent or less of the time. (Figure 2).

Finally, we classified sentence or construction types according to major lexical categories such as Noun, Verb, Noun-object, and their syntactic relations such as Noun-verb, Noun-verb-noun. The mean number of lexical categories per construction type was used to determine the occurrence of major categories in a variety of contexts. This comparison produced what we considered to be the only meaningful difference between the two groups. That is, despite similar phrase structure rules and frequently occurring transformations, the deviant children did not use major linguistic categories in as many different contexts or syntactic frames as did the normal children. (Figure 3). (Morehead and Ingram, 1970).

Our second question was to ask what such a restriction in the ability to vary the placement of lexical items or words in sentences and the subsequent reduction of ability to develop a large repertoire of sentence types could tell us regarding the nature of language deficit in children. As a result we are now determining whether or not the same differences would be more pronounced if the language samples of a deviant group were analyzed in semantic terms and their relations. Fortunately, Roger Brown (1970), using techniques developed by Bloom (1970), has just completed extensive grammatical and semantic analysis of the three normal children he studied, plus additional data for fifteen cases reported in the literature. Brown, using recent work in linguistics, coded his data in semantic categories of agent, action, object, etc., and their relations--agent-object, action-object, agent-action, etc. Moreover, he also considered how term (agent-action) relations are expanded. For example, agent-action could include a noun phrase in the object term. This analysis allows the distinction between utterances which have a three term relation, such as Adam hit ball, from a two term relation with a noun phrase, such as hit Adam ball. It is quite possible that linguistically deviant children who show similarities to normal children on superficial measures such as mean words per utterance would expand a two term relation with a noun phrase rather than add a third relation. Presumably, there would be considerable savings in this strategy for a child with attention, memory and retrieval deficits.

Additional evidence for taking this direction in the research comes from the development of inflectional morphology in the two groups we compared. (Figure 3). The deviant group for the first three levels of development used more inflections than the normals despite similar utterance length. This suggests that the deviant group adds inflectional endings, such as plural, past tense, progressive affix, etc., before they expand the number of terms used in a given relation.

We are now collecting large language samples (500 utterances) on three linguistically deviant children to compare with Brown's (1970) three normal children. The deviant group represents a highly select population which shows no severe deficits save linguistic retardation. The two groups have been matched on the mean number of morphemes per utterance and represent the normal developmental period of between 18 and 36 months. Complete contextual information has been collected for each utterance and all of the language samples have been collected in the home (Bloom, 1970). The sampling sessions are generally two hours in length and between 9 and 12 sessions are needed to complete the sample. Each utterance from the samples is being coded in the semantic categories of agent, action, object, locative possessor, possessed, etc., and their relations action-object, agent-action-locative, agent-object, etc.

Preliminary analysis of data suggests that the deviant child's deficit lies not in his ability to develop base aspects of grammar but rather in his ability to develop additional terms and the relations in which to use those terms. In effect, he fails to develop at a normal rate, despite having what appears to be an adequate base grammar, a rich repertoire of utterances reflecting expanded grammatical and semantic relations. This relational deficit raises the question of a specific cognitive deficit. It is to this question that we now turn.

Recently, there has been tremendous interest in cognitive precursors to language--primarily due to recent work by Sinclair in Geneva, Switzerland, using Piaget's theory and Dan Slobin, in Berkeley, who is collecting cross-cultural data on language development.

Piaget (1970) states that language is part of a general representational system which includes deferred imitation, imagery, symbolic play, dreaming and graphic representation or drawing. Moreover, the knowledge of objects and their relations must precede symbolic or representational knowledge, and symbolic knowledge must precede the use of signs or language. Thus, following Piaget, we would predict that a child delayed in language development would also be delayed in other aspects of representational development. We have just replicated a study by Lovell, Hoyle and Siddall (1968) which found that children with language delay are also delayed in symbolic play. Using low level linguistically deviant children, we predicted that linguistic level and symbolic play would be more closely correlated than linguistic and general (non-verbal) intellectual development as determined by such tests as the Leiter Performance Scale.

One task was to give the child select objects for free play under the following conditions:

Condition A: The child was given a doll, doll bed and a doll blanket.

Condition B: The child was given a doll, shoe box and a piece of standard typing paper.

Condition C: The child was given all the objects provided in Conditions A and B.

The three conditions were randomized across the five subjects used in the study. If the child was using early object and relational knowledge, then the items under Condition A were played with according to their known physical properties and relations. That is, the child put the doll on the bed and covered it with the blanket. If the child could symbolize or indicate double knowledge of the objects and their relations, then under Condition B, similar objects (shoe box and paper) were substituted for the real objects (doll bed and doll blanket). Condition C was used as a control and took several presentations at different time periods to determine if the child would interchange objects when both the real and the similar objects were available. Analysis of the observational data in our small sample suggests that linguistic level and symbolization did correspond more closely than base intellectual development in the five children studied. This research needs to be expanded using a large controlled population of linguistically deviant children.

Finally, if children with linguistic deficits do reflect a base representational deficiency rather than a base intellectual deficiency, then certain diagnostic tests should reveal this pattern. In an attempt to provide some additional data relevant to this hypothesis, we have divided the subtests of the Illinois Test of Psycholinguistic Abilities into subtests representing base intellectual tests, and subtests representing general representational tests, such as the visual matching subtest. The performance on base intellectual subtests of the ITPA were then compared with the performance on the Leiter Performance Scale and the Columbia Maturity Scale, while the performance on general representational subtests was compared with the performance on the Goodenough Draw-A-Man Test. We predicted that chronological age should be more closely related to the performance on the base intellectual subtests than on the subtests which test general representational behavior. Preliminary analysis of data collected on 120 children ranging in age from four to ten years supports the hypothesis of a general representational deficit in linguistically deviant children.

In summary, we feel that we have some data suggestive of a general representational deficit in linguistically deviant children and that this type of research will be very informative regarding the nature of such a deficit.

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LEGENDS FOR FIGURES

Figure 1 - The average rank of the forty transformations and their frequency of occurrence for the normal and deviant groups.

Figure 2 - The average rank of the infrequently occurring transformations and their frequency of occurrence for the normal and deviant groups.

Figure 3 - The mean number of lexical categories per construction type plotted across five linguistic levels for the normal and deviant groups.

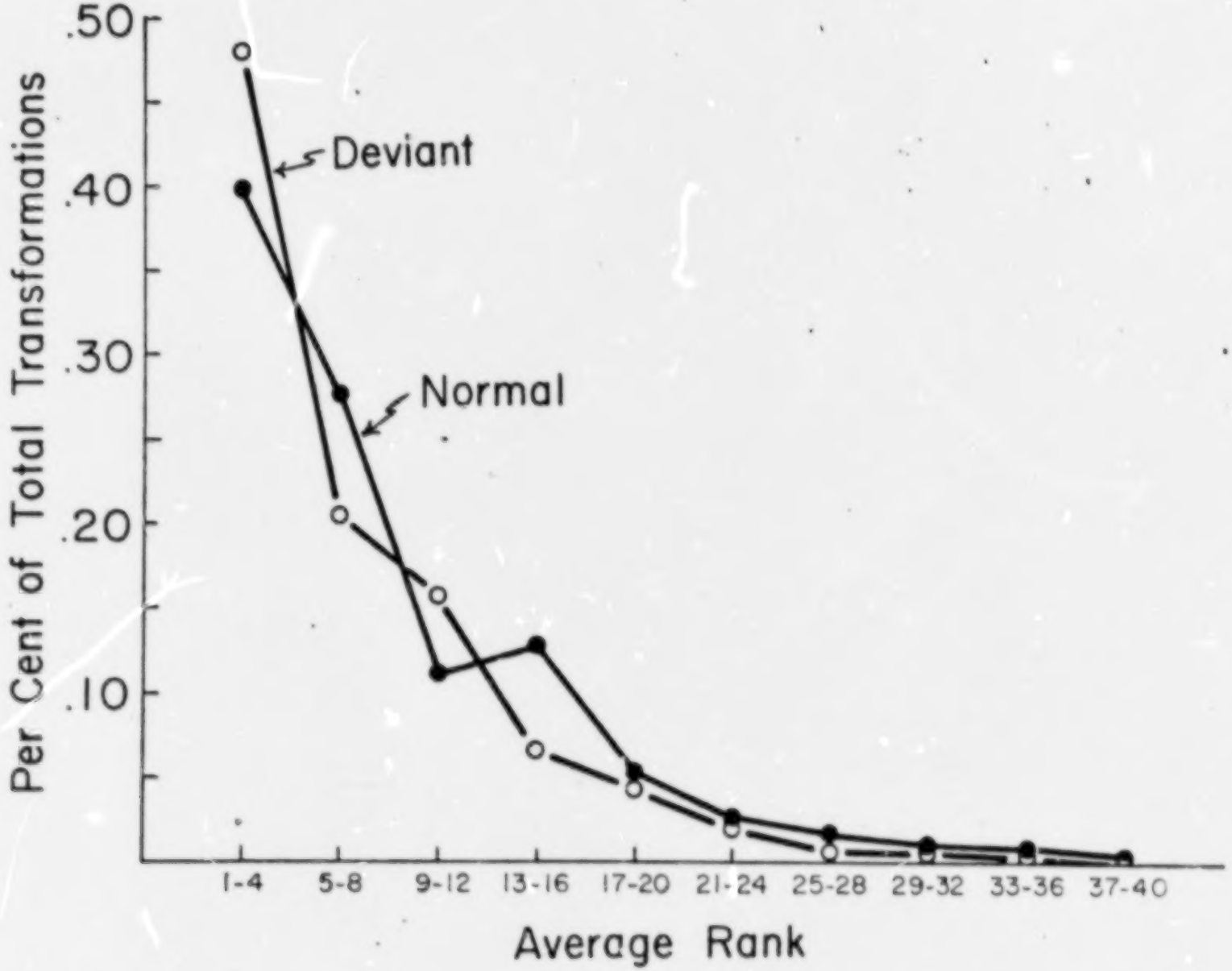
.50
.40
.30
.20
.10
Per Cent of Total Transformations
Deviant
Normal
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-32
33-36
37-40
Average Rank

Figure 1

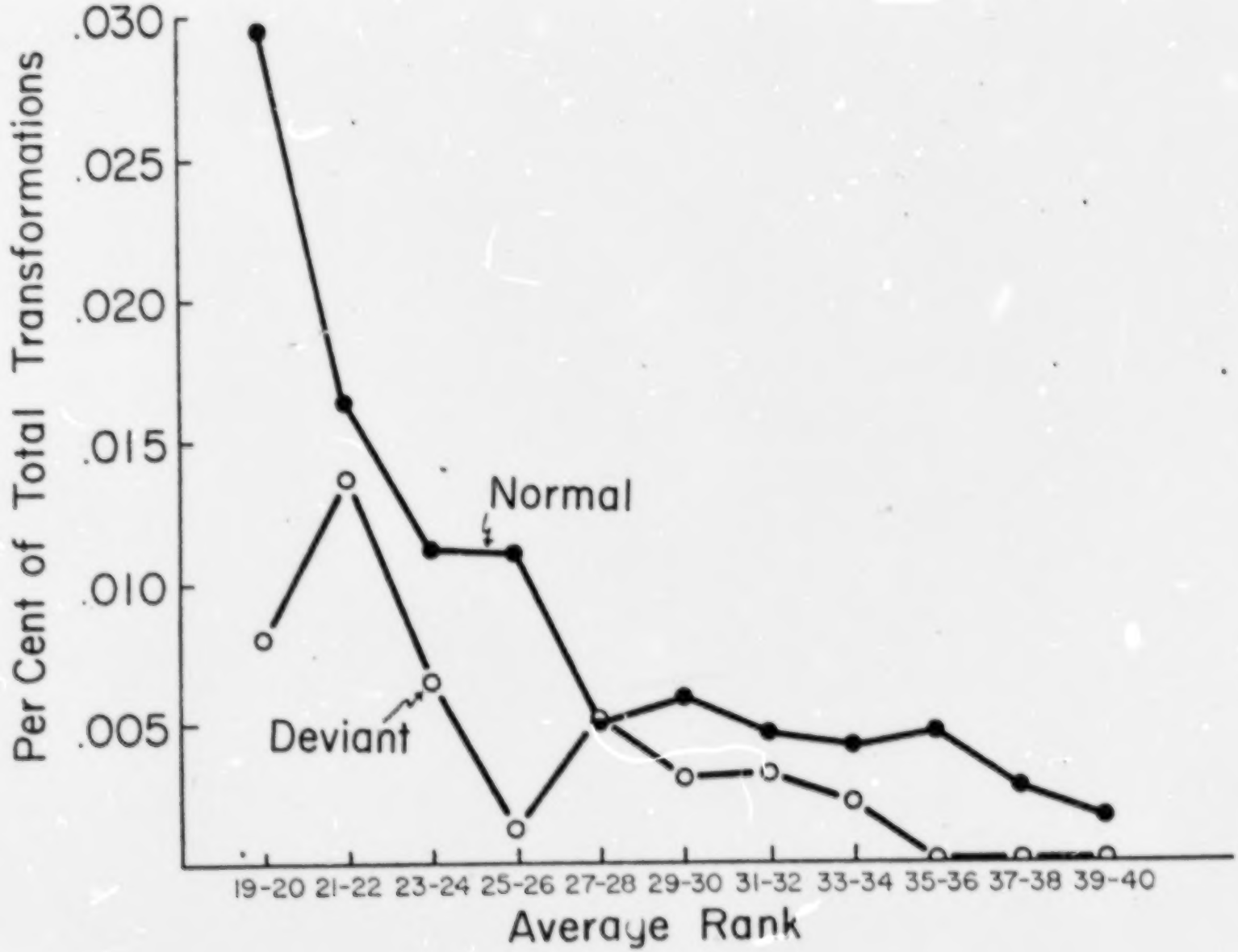
Per Cent of Total Transformations
.030
.025
.020
.015
.010
.005
Normal
Deviant
19-20 21-22 23-24 25-26 27-28 29-30 31-32 33-34 35-36 37-38 39-40
Average Rank

Figure 2

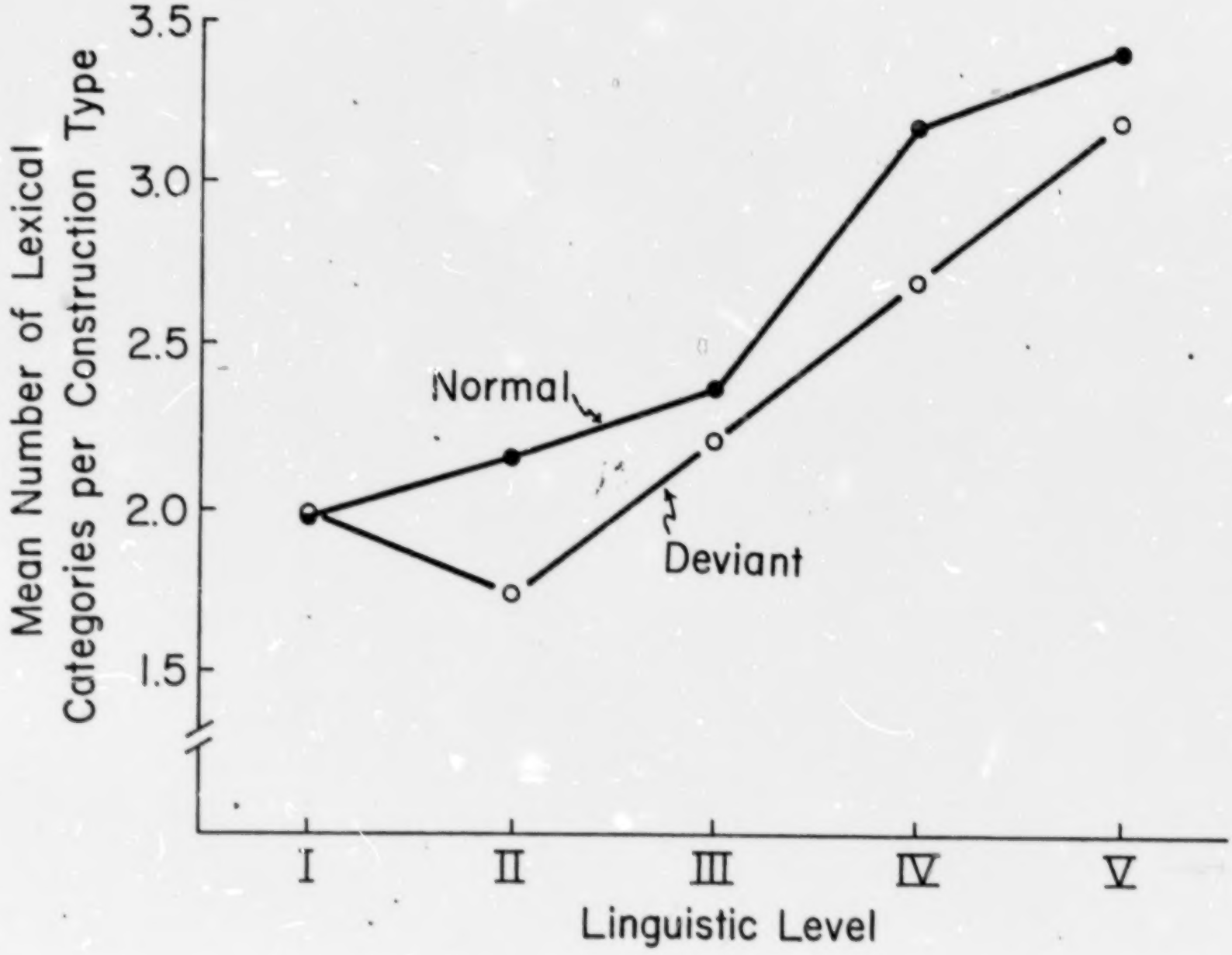
Mean Number of Lexical Categories per Construction Type
3.5
3.0
2.5
2.0
1.5
Normal
Deviant
I
II
III
IV
V
Linguistic Level

Figure 3